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EFL700A39

EnFilm™ - rechargeable solid state lithium thin film battery

Datasheet – production data

Features

- All solid-state
- Ultra thin
- Fast recharge
- Low capacity loss
- Long cycle life
- RoHS compliant
- UL file number: MH47669

Complies with the following standards

- IEC 62133
- UN Manual of Tests and Criteria, Part III, subsection 38.3
- ISO7816 / IEC10373 (mechanical / flexibility smartcard standards)

Applications

Device is intended to be used in a wide range of applications including:

- Internet of things
- Sensors and networks
- Smart card
- RF ID tags
- Energy storage for energy harvesting devices
- Non implantable medical applications
- Backup power
- Wearable applications

Description

The EFL700A39 is a thin film rechargeable lithium battery. The battery has a $LiCoO_2$ cathode, LiPON ceramic electrolyte and a lithium anode.

Table 1. Device summary

Symbol	Value
Capacity	0.7 mAh
$V_{nominal}$	3.9 V
V_{op}	3.0 to 4.2 V
R_{int}	100 ohm
I_p	10 mA
Dimension	25.7 x 25.7 mm
Thickness	220 µm

TM: EnFilm is a trademark of STMicroelectronics

1 Characteristics

Table 2. Absolute ratings

Symbol	Parameter	Value	Unit
V_{op}	Operating voltage	3.0 – 4.2	V
I_c	Maximum continuous discharge current	5	mA
I_p	Maximum pulsed discharge current(1) at 30 °C	10	mA
T_{stg}	Storage temperature range	- 20 to 60	°C
T_{op}	Operating temperature range(2)	- 20 to 60	°C
C_{lfe}	Cycle life (to minimum of 80% of initial capacity)(3)	4000	cycle

1. Pulsing conditions: 100 ms on, 0.9 s off, cut off voltage during pulse = 2 V for higher pulses current contact ST representative
2. 1/30 C discharge at -20 °C: operating at 60 °C reduces the cycle life
3. 1C discharge rate: cycling between SoC = 75% to SoC = 0% (SoC = state of charge)

Table 3. Electrical characteristics

Symbol	Parameter		Test conditions	Min	Typ	Max	Unit
C	Nominal capacity (minimum)		T = 30 °C Discharge @ 1 mA Cut-off voltage = 3.0 V	0.7	-	-	mAh
R_{int}	Internal resistance		T = 30 °C	-	100	120	ohm
C_t	Charge time to 80% of full capacity		Constant voltage = 4.2 V	-	-	20	mn
S_{Disch}	Self discharge	Charge loss (recoverable)	Room temperature(1) SoC = 50%	-	3		%/year
		Capacity loss (Non-recoverable)		-	20		% over 10 years

1. For other operating conditions contact ST representative

Figure 1. Typical discharge curve

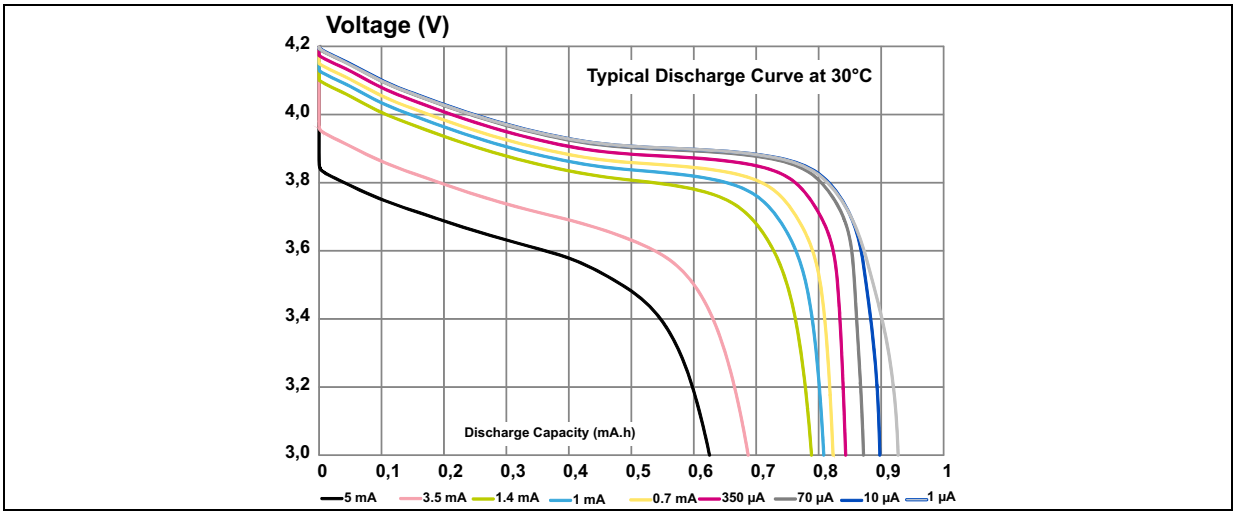


Figure 2. Typical charge curve

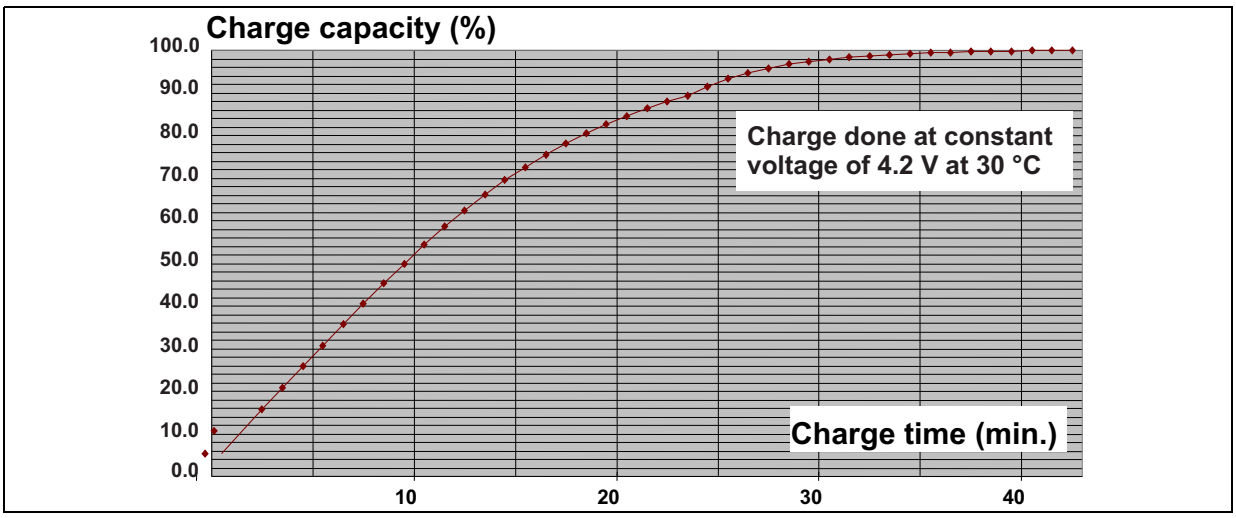
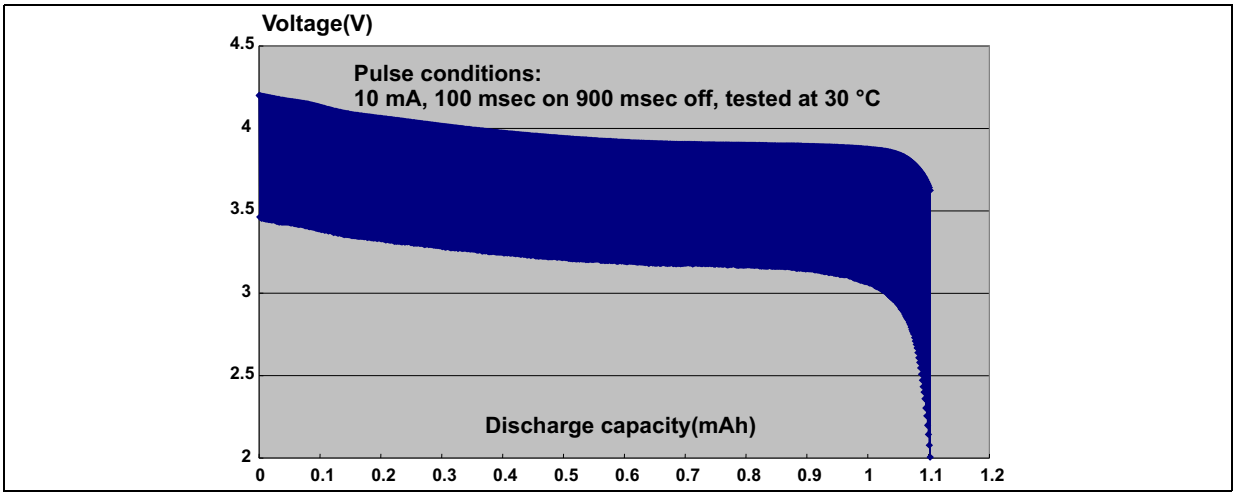


Figure 3. Typical pulsed discharge curve



2 Application information

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3 Recommended charge and discharge processes

3.1 Charge

Battery can be charged from a 4.2 V ±0.05 V constant voltage source with or without current limit. More than 90% of the total capacity is recharged when the charge current falls below 0.1 mA.

3.2 Discharge

When discharging under constant current or constant load, the cut-off voltage should be no less than 3.0 V. Cut-off voltage can be lowered to 2.0 V for pulsed discharge.

3.3 Design recommendations:

Refer to STMicroelectronics application note:

AN4085:Design considerations of the EFL700A39.

4 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: *www.st.com*. ECOPACK® is an ST trademark.

Figure 4. Package dimension definitions

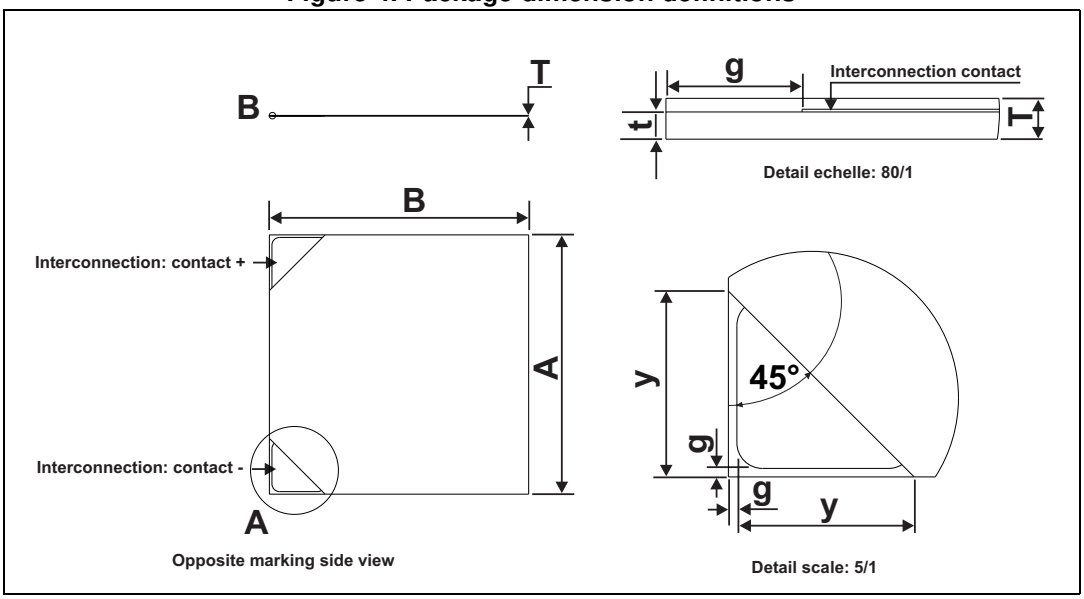


Table 4. Package dimension values

Ref	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	25.2	25.7	26.05	0.992	1.012	1.026
B	25.2	25.7	26.05	0.992	1.012	1.026
T		0.20	0.22		0.008	0.009
t		0.07			0.003	
Y	5.3		5.9	0.209		0.232
g		0.3			0.012	

Figure 5. Footprint

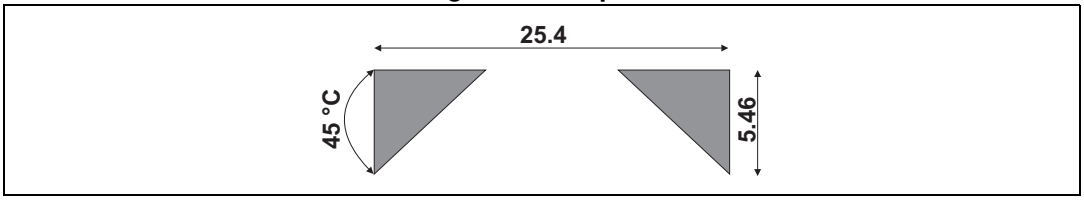


Figure 6. Tray dimensions

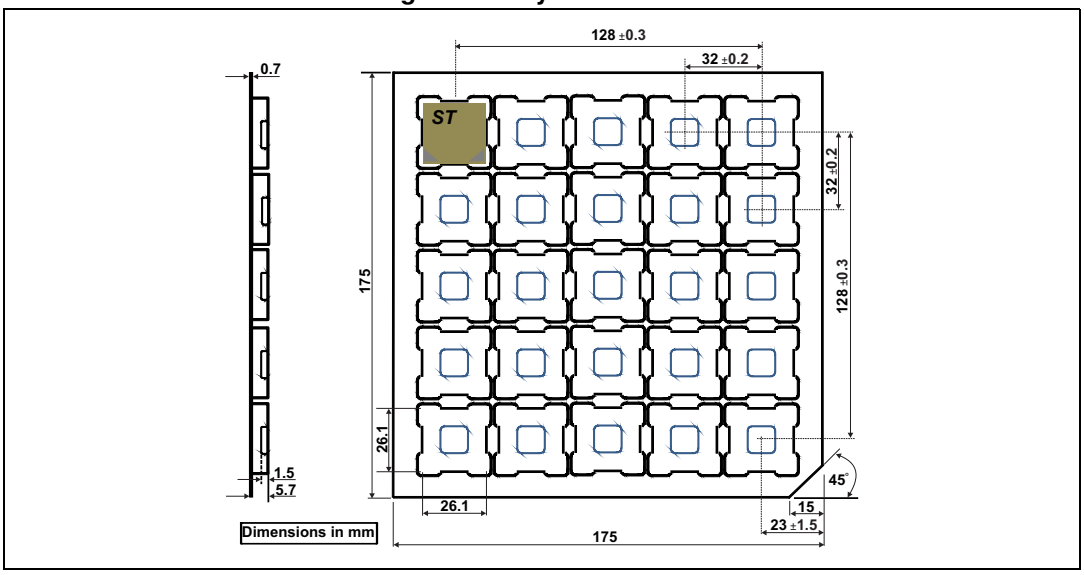
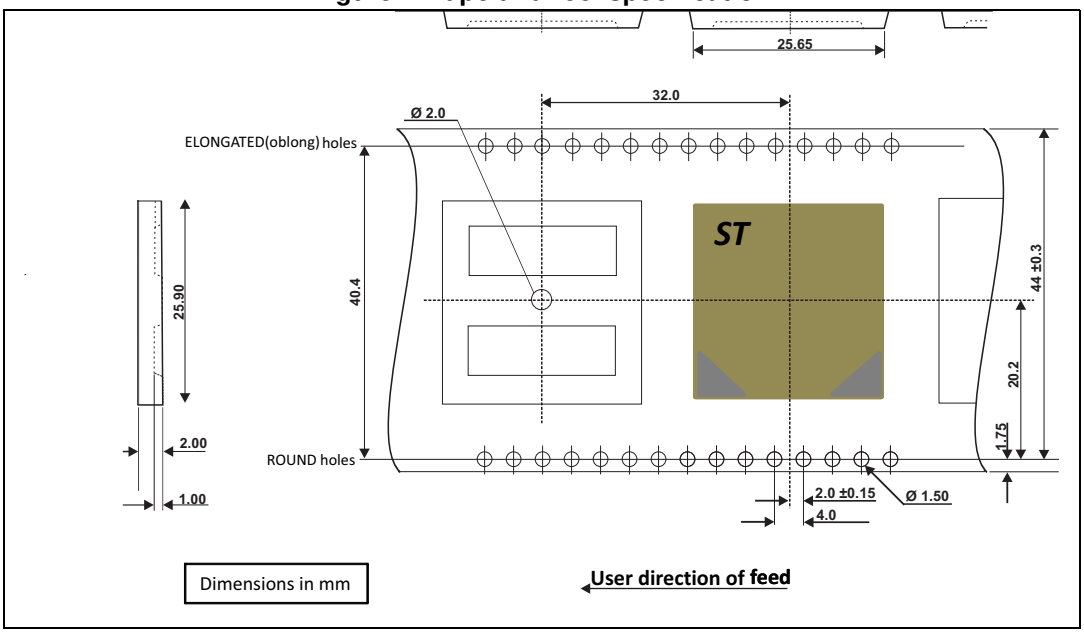


Figure 7. Tape and reel specification



5 Recommendations for the assembly on PCB

Refer to the STMicroelectronics Application note:

AN4046: “EnFilm™ micro battery EFL700A39, recommendations for manual assembly on PCB“.

AN4351: “EnFilm™ micro battery EFL700A39, automatic or semi-automatic mounting on PCB“.

6 Ordering information

Figure 8. Ordering information scheme

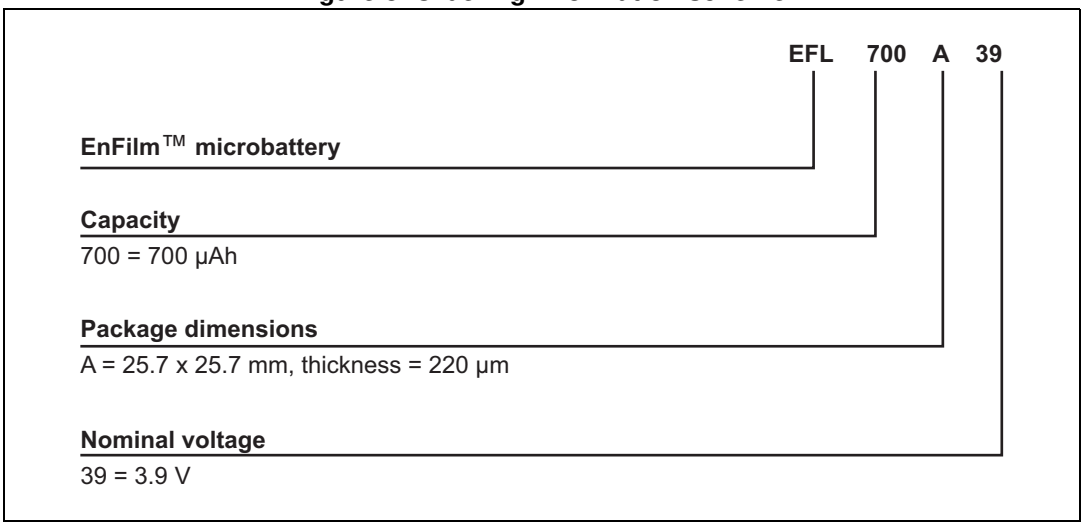


Table 5. Ordering information

Order code	Marking	Weight	Base qty	Delivery mode
EFL700A39	EFL700A39	0.2 g	25	Tray
EFL700A39-RL	EFL700A39	0.2 g	100	Tape and reel

7 Revision history

Table 6. Document revision history

Date	Revision	Changes
08-Apr-2010	1	Initial release.
23-Apr-2012	2	Insert AN4046 reference for recommendations for the soldering process and update *Figure 4*.
27-Sep-2013	3	Updated *Figure 4* and *Chapter 5*.
05-Nov-2013	4	Updated *Figure 1* and *Features*
02-Jun-2014	5	Updated *Features*, *Applications*, *Table 1*, *Table 2*, *Table 3*, *Table 4*, *Table 5*, *Figure 4* and *Figure 8*. Added *Figure 5*, *Figure 6* and *Figure 7*. Added *Chapter 3.3*.

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